FOLIO

University of Alberta 7 November 1985

New Strategies to Counteract Soil Degradation

Soil degradation is a serious problem in all regions of Canada and poses the greatest threat to survival of our agricultural system, according to both the report of the Senate Committee on Agriculture, Fisheries and Forestry and that of the Alberta Land Base Panel dealing with maintaining and expanding the agricultural land base in Alberta. The effects of land degradation are significantly reducing the economic productivity of agriculture in Alberta and the prairies in general. Future impacts of degradation will be greater because we are now experiencing only the tip of the ice berg. Economic models conclude that under current conditions net income to farmers could double if land degradation were arrested.

An NSERC Strategic Grant to N.G. Juma, S. Pawluk, and M.J. Dudas of the Department of Soil Science is aimed at developing management strategies which prevent degradation of our soil resource base. Biologically, chemically, and physically, soils are extremely heterogeneous and interactive at all scales of investigation, from μm to km. Consequently, one investigator or discipline in isolation can make little progress in understanding such a cybernetic system. This research project takes an holistic approach to understanding the soil system in attempting to develop innovative solutions to ensure the long-term productivity of agricultural soils. The project, which is funded for $420,000 over three years, is unique in integrating Soil Biology/Biochemistry, Soil Chemistry, Soil Micromorphology and Nutrient Cycling. According to the panel which reviewed the proposal and which visited campus to speak with the researchers and to examine the University's facilities and capability to conduct this study: "These integrated studies form a novel and innovative approach to solving basic problems associated with soil degradation."

The project grew out of studies funded by Alberta Agriculture's Farming for the Future program, which have been centred on the Breton Plots. The Breton Plots site has been managed by the Department of Soil Science since 1929 and contains long-term crop rotations. They provide an ideal outdoor laboratory at which to conduct innovative integrated studies.

Innovative research on such complex problems requires collaboration of scientists with individual strengths in diverse disciplines who see the soil system as the ultimate focus of their research and teaching, and who also function effectively in an interactive collaborative environment.

It is the department's philosophy manifested through staffing and internal administrative policies to foster such collaboration. This project is an exciting step forward both for this approach to research in Soil Science and for solving an extremely serious problem with profound economic implications. Support at both the provincial and federal levels for such studies to help maintain a stable soil resource is gratifying.*□

** This article was submitted by W.B. McGill, Professor and Chairman of Soil Science.*

Contents

Siddon to Address Meeting

The Hon. Tom Siddon, Minister of State for Science and Technology, is a guest of the University today (7 November). Mr. Siddon toured a number of research laboratories in the early part of the day; at 8 p.m., the University community is invited to hear the Minister speak on "The State of Funding of Science and Technology in Canada." A question and answer period will follow.

The meeting, which is also open to the public, will take place in 1-05 Business Building. Sponsors of the meeting are the University and the Edmonton Council for Advanced Technology (ECAT).□

Aiming to Please

It's full speed ahead for the first stage of renovations to the Earth Sciences Building east wing. When completed in spring 1986, the Departments of Geology, Entomology and Soil Science will have their old home back. The remainder of the renovations will begin in June and are scheduled to be completed in the spring of 1987.

At the Heart of the (Board) Matter . . .

- At its meeting on 1 November, the Board of Governors announced the appointment of two new members: Ed Wachowich, Alumni representative (replacing Jean Mucha), and Sandy Pearson, public member (replacing Max Ritchie).
- In honor of former Vice-President (Facilities and Services) R.E. Phillips, the University Services Building has been renamed the R.E. Phillips Services Building.
- In an unusual move, the Minister of Advanced Education has undertaken—as a one-time grant—to pay half the cost (up to a maximum of $5,725,000) of renovating and refurbishing HUB Mall.
- $500,000 has been reallocated by the Planning and Priorities Committee and will be distributed to a number of departments for creation of new projects or programs. "It is an exciting step, and this is a happy, happy item," said a beaming Myer Horowitz. More in next week's *Folio* about these new academic initiatives.
- President Horowitz announced that, as a result of Judge Rosalie Abella's visit, which had made a tremendously positive impression on administrators as well as academics, it was now his intention to appoint, on a temporary, part-time basis, someone who would assist him on equity concerns.□

The PCB Problem — An Interview

Few substances seem to create more public concern than PCBs. The transformer oil spill on the Trans Canada Highway near Kenora, Ontario, in April is a recent incident that illustrates the concern. Recently Maureen Payne on behalf of the Alberta Special Waste Management Corporation interviewed Professor Walter Harris, former Chairman of the Chemistry Department. Folio *presents a condensed and slightly revised copy of that interview.*

Interviewer: For several years and particularly recently, the subject of PCBs has received a great deal of attention. There must be something special about them compared with other materials. What are PCBs? What have they been used for, how much has been used, what is their toxicity, and how can they be destroyed? First tell me what the initials PCB mean.

Dr. Harris: PCB stands for polychlorinated biphenyls, a group of over 200 similar substances. Let's start with biphenyl, the parent compound. It is white, solid, stable, chemically unreactive, and of high boiling point. The molecule consists of 12 carbon atoms and 10 hydrogen atoms. Any or all of the hydrogen atoms can be replaced by chlorine atoms. Those molecules in which two or more of the hydrogen atoms have been replaced with chlorine atoms are called polychlorinated biphenyls. When biphenyl is chlorinated, its properties are changed. The products are liquid of even higher boiling point and are even more stable and unreactive. If you substitute enough chlorine, it's no longer flammable. The clear, colorless liquid is heavier than water and has essentially no odor. The solubility in water is negligible, like that of the parent substance.

Interviewer: When were PCBs first made?
Over a century ago.

Interviewer: Are PCBs still being produced?
Manufacturing of PCBs was stopped in 1979 in the United States—the source of most of the PCBs imported into Canada. Canada halted the use of PCBs in new equipment in 1980. However, authorities in both Canada and the United States permit electric utilities to continue to use equipment filled with PCBs. Many older electrical transformers and capacitors contain almost pure PCBs.

Interviewer: How were PCBs first used?
Starting in 1929 they were used widely in literally hundreds of ways. The amount runs into hundreds of millions of pounds. Broadly, they have been used in both "closed" and "open" situations.
"Closed use" refers to applications where the material is sealed in a container of some kind. The number one "closed" use was as the fluid in electrical transformers and capacitors.

Interviewer: Why were they used so widely in these ways?
Many transformers and most capacitors need to be filled with a fluid that is unreactive, is extremely stable, and has a high boiling point and a high dielectric constant (an important electrical property). It is also highly desirable that it will not burn. PCBs with five or six chlorine atoms fit these requirements almost perfectly because they are liquid, extremely stable, non-flammable, have high boiling points, and have high dielectric constants.

Interviewer: What are some examples of open uses?
I cannot begin to name them all, but I can give some examples—a base for printing inks, a flame retardant in lubricating oil, a plasticizer for resins and rubber and paints and waxes, a cutting oil for machine shops, microscope slide oil, and carbonless copy paper.

Interviewer: Where are the hundreds of millions of pounds of PCBs that have been used? Where are they now?
I have seen statements that a large fraction of all PCBs made is in the environment. I have no reason to doubt that.

Interviewer: Would you find evidence of PCBs in our bodies?
Undoubtedly. Traces of PCBs have been found in penguins, polar bears, and mother's milk. PCBs really are all around us.

Interviewer: Is there a background level?
Yes. We all probably have one or two parts per million in the fat in our bodies. For those who worked a great deal with materials containing PCBs, it might be ten parts per million or more. If your backyard is examined appropriately, there is no doubt PCBs will be found there, just as they have been found in the middle of the Pacific on an uninhabited island.

Interviewer: How has it spread everywhere?
Here I will speculate. Probably mainly from the open uses such as through newspapers to the extent that they contain PCBs in printing inks; through resins and rubber and paints and so forth to the extent that they were plasticized with PCBs; from roads treated for dust suppression with PCBs. Undoubtedly in open low-temperature burning, such as in garbage dumps with waste oils, newspapers, plastics, the PCBs are heated enough to vaporize them. And of course from these sources they would spread to the air, the soil, the water throughout the world.

Interviewer: What is the trend in the environment?
Since PCBs are extremely unreactive, they persist in the environment. However, they slowly break down by natural processes, probably as a result of bacterial action. I have seen some data indicating that the general background level has decreased in the last decade when, of course, the PCBs began to be phased out. And that decrease would apply to levels in you and me, in the soil, and so forth. I think we can expect the level in the environment to continue to fall.

Interviewer: Too much of anything is toxic, and this fact would apply as well to PCBs. Can you give me an idea of how toxic they are?
Along with four million other substances, you should not eat them. To an extent, we all have been exposed at some level. But, for example, those who have worked in press rooms where PCB-based inks were used would have been exposed more than the ordinary individual. Particularly those who have been filling and repairing transformers and capacitors have been heavily exposed. From the fact that they are unreactive and soluble in fat, they are not eliminated from the body quickly once ingested. The best information I can find indicates that they are enormously less toxic than, for example, cyanide or nicotine.
From rat experiments it appears they are probably about as toxic as glycol (antifreeze in our cars) and somewhat more toxic than table salt. For glycol the lethal level in humans is about 1.4 g. ingested per kg. of body weight (1,400 parts per million); for table salt the lethal level is probably about 4 g. per kg. (4,000 ppm.).

Interviewer: What led PCBs to be banned?
The Yusho incident in Japan. In 1968, the fluid from a heat exchanger leaked into cooking oil, and about 1,000 Japanese inadvertently ate appreciable amounts of the fluid along with their cooking oil. The primary symptom was chloracne, a persistent skin disorder that only slowly clears up. This problem and a suspicion about cancer production prompted the decision to discontinue the manufacture of PCBs. Since that time a great deal of investigation has been carried out. It now appears virtually certain that the cause of most of the Yusho problems was a small but significan amount of polychlorinated dibenzo furans (a different group of chemica compounds) present as impurities in the fluid that was presumably PCB. The furans are much more toxic, and so the information about the Yusho incident and PCBs is confounded by the furan impurities.
Because of the stability of the PCBs and their resulting persistence, I think it was important that the *open uses* of the PCBs be discontinued. Adding tens of millions of pounds each year to the environment is not a good idea. It was prudent to avoid potential future problems by discontinuing the open uses, since the potential for future adverse health effects would increase as the level increased.

Interviewer: What is the long-term experience with PCBs in Canada and the U.S.?
Enormous amounts have been made and used since 1930. Millions of us have been exposed on a daily basis for long periods of time. These include transformer fillers and repairmen and to a lesser extent machinists, office workers, painters, lab technicians, and so on. No acute or chronic health effects have been identified as a result of all this exposure.

Interviewer: Did most PCBs used on this continent contain significant amounts of the furans?
I think that it is reasonable to conclude that they did not contain toxicologically significant levels, since chloracne has not been noted.

Interviewer: How do you dispose of PCBs?
There are several ways, but the best in my opinion is high-temperature incineration. PCBs are organic; even though they are extremely stable organics, they are still organic, and like all complex organic molecules, they are broken down by high temperature. High-temperature incineration in excess of 1,000°C with excess air is the common destruction method. There are several other methods that can be used for destruction, including a molten-salt method and direct chemical attack on the carbon-chlorine bonds.

Interviewer: How does high temperature affect the molecule?
High temperature "breaks every bond in its body." When a PCB is heated to high temperature in air, it quantitatively breaks the carbon-carbon bonds and the carbon-chlorine bonds. You end up with carbon dioxide,

water and hydrochloric acid. When scrubbed with a basic solution, the hydrochloric acid is removed. Carbon dioxide and water are left. The carbon-carbon and carbon-chlorine bonds break at about 800 to 900°C. At that temperature, the molecules can't stand it any longer and break up.

Interviewer: When processed in a high-temperature kiln, what substances will come out of the stack?
Carbon dioxide and water. Those are the end products of the carbon and the hydrogen. From the hydrochloric acid you obtain a dilute salt solution.

Interviewer: Can they be transported with a high level of safety?
Yes. It is far safer to transport PCBs than materials that are flammable (for example, gasoline), or reactive (for example, sulfuric acid) or highly toxic (for example, chlorine). If there were an accident or a spill there would be a minimal level of threat either immediately or for the long term. Remember we are dealing with a highly stable, unreactive material and clean-up procedures should be consistent with these properties. Bear in mind also that the amounts in a spill would be negligible compared with the amounts that used to be dispersed through the open uses.

Interviewer: How much of these PCBs are in use in Alberta, and how much are in storage ready to be disposed of when the Alberta Special Waste Treatment Plant is completed in 1987?
According to recent estimates, several thousand tons of PCBs are estimated to be in storage throughout the province, mostly at utility storage facilities, the privately owned storage facilities located at Nisku, and at other industrial locations throughout the province.

Interviewer: In the news media and elsewhere, we repeatedly see statements to the effect that PCBs are lethal, highly toxic, deadly, cancer-causing. This is not the impression that you are giving.
If those things were accurate descriptions of PCBs, they would indeed be frightening. PCBs have been called a "political waste" and I agree with that description. In some news media we have a virtual drumbeat of "lethal", "deadly", "highly toxic" and "cancer-causing" to the point where these distortions are widely believed to be correct. For several years, I have been following developments and I find little to substantiate these perceptions. Human experience with PCBs is extensive. For former transformer-capacitor workers in the U.S. with high long-term exposures, significant increases in any type of cancer have not been found, *nor has an increase in mortality overall been observed*. Experiments in which animals were forced to ingest massive doses of PCBs have indeed resulted in tumor promotion. There are many other substances (saccharin comes to mind immediately) that can be linked with cancer under similar extreme conditions.
It often takes a lot of painstaking work to find sound explanations for observations. As a result of the Yusho affair PCB was listed as a "suspected carcinogen". It took the Japanese a decade to collect the data to find the cause of the Yusho disease (the furans). And there has been a gradual retraction of the initial reports linking Yusho to PCB (Yunita, Am. J. of Ind. Med. 5 45-58 (1984)). The level of justified suspicion about PCB and cancer has therefore decreased with time, and my impression is that the term "suspected carcinogen" now appears less frequently in reputable literature. As a response, environmental alarmists have shifted ground and claim an expanding list of other dysfunctions. The list of claims grows faster than sound studies can possibly be carried out. No attention is paid to the results of reputable investigations of the extensive and decades-long human experience that show no evidence of human health effects, short or long term. (NIOSH Arch: Environ. Health *36*, 120 (1981). See also PCB report of American Council on Science and Health, January 1985.)
It is, of course, forever impossible to prove that PCBs do not cause cancer in humans. It is however irresponsible to imply that humans are under real threat of cancer from PCBs in the light of the extensive human experience and in the absence of some direct evidence. If we are under threat of cancer, I keep asking, "If cancer-causing, what part of the body is the target?" "If PCBs are cancer-causing, how potent are they compared with known carcinogens?"
At a recent conference on PCBs, a paper was presented by Dr. J. Brown titled, "The Search for PCB Health Effects" (New York, EPI proceedings, 1983). He indicated that in the previous year, over a thousand papers on PCBs had been published, and his concluding statement is:

"In summary, although scientific studies can never exclude the possibility of unobservable phenomena, it does seem established that PCB exposures at the high levels provided by prolonged direct occupational contact had no reproducibly observed effects upon the health of the vast majority of exposed individuals. These individuals had exposures that were approximately a thousand-fold higher than those provided by the kinds of PCB-contaminated environments being encountered today. Accordingly, there seems little basis for concern over the health risks presented by environmental exposure to residual PCBs at today's level."

We don't need to search for health effects concerning arsenic, we don't need to search for health effects for strychnine or benzene or mercury or so on. I cannot imagine a paper describing searches for health effects for cyanide or for alcohol. For PCBs my impression is that to justify the over-reactions being taken, we must search for and find human health effects from the exposures that have occurred. To the extent that adverse health effects may exist, my conclusion is that they have been enormously overplayed.
There are a number of unexplained, unconfirmed, or "preliminary" reports of dysfunctions from PCB exposure. It is effective grantsmanship. Of course they make great news stories and serve as continuing references for others. Press conferences are not called, however, to announce retractions or an inability to confirm sensational preliminary reports.

Interviewer: In summary, what are your comments?
My conclusions are that:
1) There should be a concerted effort to regain a sense of perspective with respect to PCBs. They are of low toxicity and high stability.
2) Because of potential problems from an accumulation, the wide variety of open uses of PCBs continue to be disallowed.
3) Closed uses of PCBs such as in transformers and capacitors be continued with responsible management of any wastes.
Hundreds of millions of pounds of PCBs have been made over five decades. A large fraction of them are in the environment, and they accumulated because of their high stability and unreactivity. PCBs are everywhere, but undoubtedly the level is now falling. Millions of people have been exposed on a continuing basis with little evidence of adverse health effects. Realistically, there is now no turning back; we are committed to destroying all stocks, at great cost economically and psychologically. Technically, one must err, if at all, on the side of caution. In view of the widespread misconceptions concerning PCBs and human health, their management and destruction is a political and social problem that must be handled with sensitivity.□

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University of Alberta

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Classified advertisements: 3 p.m. one week in advance of desired publication date. This date also serves as the deadline for cancellation of advertisements. Advertisements cost 30¢ per word with no discount for subsequent insertions. There is a maximum limit of 30 words and a minimum charge of $1.50. Contributors' corrections will be assessed at $1 50 for each line in which an insertion is made. Advertisements cannot be accepted over the telephone. All advertisements must be paid for in full at the time of their submission.
Display advertisements: 3 p.m. one week in advance of desired publication date. Contact Public Affairs for sizes, rates and other particulars.

The editor reserves the right to select, edit and position submitted copy. Views expressed in *Folio* do not necessarily reflect University policy

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Water, water everywhere...but is it fit to drink?

The water that comes out of your taps has been treated so that it is microbiologically harmless.

It has been screened and strained to remove foreign particles. Then it has been disinfected, probably with chlorine. It has been rotated and beaten to get rid of further particles (engineers call the process "flocculation"); then it has gone through sedimentation and sand filtration; and, finally, it has been treated with chlorine again.

This treatment has focused on providing drinking water that is microbiologically safe and at the same time as free as possible from unpleasant taste and smell. And it produces a satisfactory answer.

Or does it?

Before treatment, both man-made and natural organics may be present in the water. In the last few years, the presence of low concentrations of organic compounds has been discovered in the water *after* treatment. (Previously it had not been possible to measure these small quantities.) Although natural compounds, such as algae and decaying vegetation in the river, are generally harmless in themselves, the concern now is that some of them react with the chlorine used as disinfectant and form compounds that are known or suspected carcinogens. A number of the compounds formed in this way have been identified, but they represent only a small fraction of those present.

What if some—or many—of the compounds not yet identified are carcinogens?

What effect is this likely to have on people who are exposed to them over a lifetime?

To find out, Peter Huck is undertaking a study to identify organic compounds in drinking water, to assess the health implications and to evaluate ways of removing them or reducing their concentrations. His investigations, which are taking place at the City of Edmonton's Rossdale Water Treatment Plant, are funded largely by Health and Welfare Canada, with support from Alberta Environment, and the City of Edmonton.

"To my knowledge, what we're doing here is unique," says Dr. Huck, who believes that his pilot plant study is the first of its type in Canada.

He is trying out four alternative disinfectants: chlorine, chloramines, chlorine dioxide and ozone—each with advantages and drawbacks.

Chlorine is the disinfectant most commonly used in North America. It has the advantage that some chlorine remains in the water after treatment (as the consumer knows only too well) and is a form of safeguard against accidental contamination after the water leaves the plant. The level of chlorine is tested at points throughout the distribution system; a drop in chlorine levels is a warning that somewhere in the system there are bacteria, and chlorine strength has been reduced in combating them. Though chlorine works well, there is concern, however, about the compounds produced when chlorine combines with organic matter in the water.

Chloramines are not as effective as chlorine at combating bacteria and are considerably less effective against viruses—but they produce lower levels of chlorinated organic compounds.

Chlorine dioxide works well as a disinfectant. It is used to a great extent in Europe and in cities such as Edmonton, where chlorine would combine with synthetic compounds in the snowmelt flowing into the river during the spring to form particularly foul-tasting and foul-smelling compounds. However, it is expensive, has some toxic properties and may produce potentially harmful by-products.

Ozone is a very powerful oxidizing agent and kills both bacteria and viruses effectively. It may even do a better job at killing viruses than chlorine does, and it has less taste and smell than chlorine. But it leaves no protective residual in the distribution system, and in combination with organic matter it may also form harmful compounds.

In Dr. Huck's study, "raw" water is sampled as it enters the pilot treatment plant, then is diverted into four streams. Each stream receives a different disinfectant as it flows through the treatment systems, which include the extra step, after disinfection, of filtration through granular activated carbon to get rid of chemical compounds.

After each step, a sample is taken and split into two portions. Part of the sample is analyzed chemically to determine what trace organic compounds might be present. The other part is biologically tested in a genetics laboratory, to obtain more information on the organic matter in the water after its exposure to the various disinfectants. (Biological tests are able to assess all compounds present in the water, even though they have not been identified and even if their concentrations is low.) The Ames test, used here, combines four specially developed strains of the bacteria *salmonella typhimurium* with each water sample; if there are any compounds in the water that could cause cancer, the bacteria will exhibit alterations in their DNA. A new set of the Ames salmonella strains is being used (the first were developed 10 years ago), and as they are being tested here for the first time with water, the study will be instrumental in validating the strains.

The main concern of a municipal water treatment authority is to provide water that is free of bacteria and viruses, palatable and without an objectionable smell. To this must now be added a further health concern: ensuring that the water leaving the plant is also free from harmful organic compounds. But do we know which disinfectant will make this possible?

These investigations are going to help answer some important questions.

Does every one of the four disinfectants, when combined with organic compounds found in water, form substances that may be carcinogens?

Is any disinfectant completely "safe," or is one of the disinfectants "safer" in this respect than the others?

"If we find that one is better than the others, it will indicate the need for further investigation," says Dr. Huck.*□

**Reprinted from the Fall 1985 edition of* Research Report.

The tables were turned (to the limelight) at the second annual President's Club Dinner in the Four Seasons Hotel Ballroom 30 October. The formal affair saw the University express its appreciation to more than 300 individual donors and more than 200 corporate donors. Their annual donations of $1,000 or more support scholarships, buildings, research projects, chair establishment, lectureships and special projects.

Activities

Forest Science students recently earned 11 of the 25 scholarships awarded annually by the Canadian Forestry Service. At a breakfast meeting at Lister Hall, the Hon. Gerald Merrithew, Minister of State (Forestry), presented certificates to **Eric Allen, Kevin Eberhart, Willi Fast, Gregory Fenton, Donald Haid, Bradley Johnson, David Langor, Kelly Loch, Bryan Neu, Albert Sproule** and **Leonard Swanson**...**David C. Secord**, Professor of Surgery and Director, SMR Animal Centre, was recently elected a Fellow of the Academy of Surgical Research...Economist **M.S. Noorzoy** has published "Long Term Economic Relations Between Afghanistan and the Soviet Union: An Interpretive Study." The article appears in *International Journal of Middle East Studies*...**Myer Horowitz** has been on the move. Between 5 and 21 October, he spoke to Phi Delta Kappa Institute on "Evaluation of Educational Personnel," addressed the South Edmonton Rotary on "The University in the 1980s," delivered the Convocation Address at Camrose Lutheran College's first graduation convocation, and represented Canadian university presidents at the National Universities Week Reception in the Parliament Buildings, Ottawa...**M.A. Jaworski** was a guest lecturer at the Middlesex Hospital Medical College, London, England. The Associate Professor of Pediatrics and member of the Muttart Diabetes Research and Training Centre presented a talk on "Lessons from the BB rat"...**B.J. Busch** was the keynote speaker at a conference on "Changing Course: Restructuring Academic Libraries" at Pack Forest, Washington, 24 and 25 October...Economist **M.S. Noorzoy** has published "Long Term Economic Relations Between Afghanistan and the Soviet Union: An Interpretive Study." The article appears in *International Journal of Middle East Studies*, Vol. 17, No. 2 (1985) pp. 151-173...On invitation of Monash University, Australia, **J.P. Das**, Director of the Centre for the Study of Mental Retardation and Professor in Educational Psychology, spent two weeks in the university's Faculty of Education. He lectured at Monash, as well as the Universities of Melbourne, Newcastle, Wollongong and Macquarie. It was also an occasion for him to visit former students of the Centre and Department of Educational Psychology who are staff members at some of those universities.

Women's Athletics Invites You to 'Adopt-a-Panda'

You are a Panda athlete on the road and your meal allowance is $6 per day. Splurge on breakfast and you might have to tough it out the rest of the day. When you return home, check your mail first thing because it might contain a note from the "Susan Nattrass Adoption Agency" to the effect that you have been "adopted." That would be good news on two levels—a higher per diem for you and each of your teammates and greater subsidization of travel costs.

(During the year teams journey to Victoria, Vancouver, Lethbridge, Calgary, Saskatoon and, occasionally, farther afield the gymnastics team, for example, will be competing in two meets in northern California).

You won't find the agency in the yellow pages but try the second level of the Butterdome (432-2832). Nattrass, Coordinator of Women's Athletics, launched the Adopt-a-Panda program about two weeks ago and, by the end of October, had "placed" 10 Pandas. Thirty-nine Pandas, all members of the 1985-86 basketball, volleyball, gymnastics and swimming and diving teams, remain on file.

It costs $350 (tax deductible) to adopt a Panda. This entitles the adoptee to such perks as membership in the Green and Gold Society, the Homecoming luncheon, season's passes for both Pandas and Bears events, parking, invitations to related social functions throughout the year and access to the Bears' Den and the Butterdome Lounge.

"Adopt-a-Panda" (But you can't take her home) is part of the Department of Athletics' drive to involve members of the community, especially alumni, in a participative role in the support of the various sports programs.□

Your Season's Greetings Save Children

Greeting cards from the Canadian Save the Children Fund are on sale now at the English Department office, 3-5 Humanities Centre.

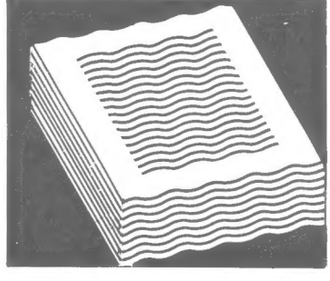
All proceeds go to self-help programs supported by the Canadian Save the Children Fund (CANSAVE). These programs enable families and communities in developing countries around the world to improve the daily lives of their children. Typical projects include digging a new village well to provide clean, pure drinking water; developing community gardens to grow a plentiful supply of fresh vegetables; and establishing secure and affectionate group homes for orphans.

This year CANSAVE is introducing a new international range of cards designed by artists from Peru, Mexico, Czechoslovakia and Canada. Subjects range from "Nativity *retablo*," to "Christmas Mouse" and are packaged in tens, one design to a package, for $5. (Early birds will find some cards from last year still available at $3.) The greetings vary with the design, and some of the designs are available with wording in French.

"Hasti-notes," for those who'd rather write their own message, are still available from previous years and are being offered at bargain prices.

There are also mini-notes for people who have rather less to say. These come in packages of ten for $2.□

Currents



Muttart Diabetes Research and Training Centre

The Muttart Diabetes Research and Training Centre was formed in June 1981 at the University of Alberta, through an endowment by the Gladys and Merril Muttart Foundation.

The objectives of the Centre are to provide core laboratory facilities for the Centre's investigators; to provide start-up funding for pilot projects; to train investigators interested in diabetes-related research; and to encourage interaction between investigators of the various disciplines

and health professionals involved in the care of diabetic patients.

In keeping with these objectives, the Centre is now accepting diabetes-related pilot project proposals. The funding for each project will be a maximum of $7,500 and the deadline for submission is 6 December 1985.

Further details and application forms may be obtained by contacting: Mrs. Shirley Moore, Executive Secretary, 8-113F Clincial Sciences Building. Telephone 432-6855.

Capital Equipment Purchases

A program has been developed to provide the carry-over of unspent capital equipment funds into the next budget year. This carry-over will be limited to the lesser of 15 percent of the departmental capital equipment budget of $50,000. Where the balance of unexpended funds is sufficient, commitments incurred by purchase orders placed before 31 December will be allocated a carry-over equivalent to the amount of the commitment.

Where the balance of unexpended and/or uncommitted capital equipment budget is currently in excess of the foregoing limits, *you are urged to place purchase orders for your further needs now* to help ensure that delivery is effected before 31 March 1986. The program will not provide a carry-over in relation to commitments by purchase orders placed later than 31 December other than in instances where a well documented justification of circumstances merits exception. Application for exemption should be submitted to the attention of D. Grover, Office of the Comptroller. Final approval on capital equipment carry-overs remains with the Associate Vice-President (Administration), J.B. McQuitty.

Unexpended funds in excess of the limiting factors will lapse into a Capital Equipment Contingency Account.

Attention Photographers

Printing Services invites University staff and students to submit colored horizontal prints or 35mm slides of Alberta scenics for consideration of use on their 1986 complimentary wall calendar. All submissions will be returned, and should be identified by the location of the scene and your name, address and telephone number.

Please send photographs to Dianne Gosselin, 108 Printing Services Building, by 15 November. Photo credits will be given, along with a prize of A, 50 personalized Christmas cards, or B, two $20 CopiCards for the winner of this competition.

Professionalism in Biology

The November meeting of the Canadian Society of Environmental Biologists (Alberta Chapter) will interest staff and students who are working or plan to work as biologists in Alberta. Recent legislation has paved the way for professional accreditation for biologists. A spokesperson for the Alberta Society of Professional Biologists will describe the Society's approach to the establishment of such a system. The meeting will be held in CW410 Biological Sciences Building 18 November at 5:30 p.m.

Ostapovitch Reception

All colleagues, students and friends are invited to join in the reception honoring Annette Ostapovitch on her retirement from the Faculty of Home Economics. The reception will take place at the Stollery Centre, fifth floor, Faculty of Business Building, Thursday, 28 November, 5:30 to 8 p.m. For invitations and more details, telephone Diana Parsons, 432-2479.

Talks

English

8 November, 2 p.m. Charles Montieth, Past-Chairman of Faber and Faber, "An Informal Talk on Modern British Publishing History." 6-40 Humanities Centre.
18 November, 4 p.m. Larry McKill, "The Literary Function of Creation and Fall of Angels in *Genesis A*." 6-40 Humanities Centre.

Zoology

8 November, 3:30 p.m. Gerald R. Smith, Museum of Zoology, University of Michigan, "Species Flocks of Sculpins in Lake Baikal and Pliocene Lake Idaho." M-145 Biological Sciences Building.
15 November, 3:30 p.m. John A. Byers, Department of Biological Sciences, University of Idaho, "Variation in the Mating System of Pronghorn." M-145 Biological Sciences Building.
22 November, 3:30 p.m. Michael A. Bell, Department of Ecology and Evolution, State University, New York, "Punctuated Equilibria, Neo-Darwinian Theory and Fossil Sticklebacks." M-145 Biological Sciences Building.

Medical Microbiology and Infectious Diseases

12 November, 4 p.m. Anthony W.C. Chow Department of Medicine, University of British Columbia, "Recent Studies in Toxic Shock Syndrome." Classroom F, 2J4.02 Walter C. MacKenzie Health Sciences Centre.
18 November, 4 p.m. Frederick A. Murphy, Center for Disease Control, Atlanta, Georgia, "The Pathogenesis of Rabies Virus Infections." Classroom F, 2J4.02 Walter C. MacKenzie Health Sciences Centre.

Boreal Institute

13 November, noon. Robert Paine, Memorial University, "Fourth World Politics: The Case of the Sami (Lapps)." 14-6 Tory Building.

Forestry

13 November, noon. Robert Swanson, Canadian Forestry Service, "Managing Alberta's Eastern Slope Forests for Water Yield—Results of Marmot and Streeter Experiments." 4-1 Mechanical Engineering Building.

Committee for the Improvement of Teaching and Learning

13 November, 2 p.m. Karel Puffer, "Development of Course Outlines." W-2 Tory Building.
14 November, 8:30 a.m. Michael Szabo, "Computer Managed Instruction at the University of Alberta." 221 General Services Building.
16 November, 9 a.m. Rosemary Liburd, "Assertiveness and You." 225 Athabasca Hall.
20 November, 3 p.m. Roberta Carey, Robyn Mott and Lois Marckworth, "Teaching Dossier." W-2 Tory Building.
21 November, 2 p.m. John Kuspira and Steve Willard, "Coffee With Rutherford Award Recipients." 2-55 Assiniboia Hall.

Catholic Campus Ministry

13 November, 7:30 p.m. Loretta Foley, "Conversion and Reconciliation." 102 St. Joseph's College.
20 November, 7:30 p.m. Frank Henderson, "Celebration of Word and Eucharist." 102 St. Joseph's College.

Limnology and Fisheries Discussion Group

14 November, noon. Annette Trimbee, "Blue-Green Algae. Why Are There so Many in Alberta Lakes?" G-217 Biological Sciences Building.
21 November, noon. Tom Winter, U.S. Geological Survey, "Ground Water-Lake Interactions." G-217 Biological Sciences Building.

Soil Science

14 November, 12:30 p.m. Bill McGregor, Senior Research Representative, ELANCO, "Research in Industry." 281 CAB.

Economics

14 November, 3:30 p.m. Roger Bowden, Universities of Western Australia and British Columbia, "Reflexive Forecasting of One-Off Events." 8-22 Tory Building.

Music

14 November, 3:30 p.m. George Arasimowicz, "Electronic Music in Canada." 1-29 Fine Arts Building.

Romance Languages

14 November, 4 p.m. G. Watson, "Critical Theory and the Dialogical Principle." Arts 348B.

Entomology

14 November, 4 p.m. G.G.E. Scudder, Department of Zoology, University of British Columbia, "Morphological and Physiological Adaptations in the Milkweed Bug (*Oncopeltus*)." TBW1 Tory Breezeway.
21 November, 3:30 p.m. H.V. Danks, Biological Survey of Canada, Ottawa, "Biological Surveys: A Global View." TBW1 Tory Breezeway.

Advisory Committee on Women's Studies

14 November, 7:30 p.m Anne McLellan, "Women and the Charter." Co-sponsored by the Faculty of Arts Women's Studies Lecture Series. L-1 Humanities Centre.
20 November, 7:30 p.m. Lynda Lange, "Feminism and Political Choice: The Impact of Feminism on Political Theory." Co-sponsored by the Philosophy Department. 2-115 Education North.

Library Science

15 November, 3:30 p.m. "Alberta Booksellers." Speakers: Tom Edge, Abacus Books; Laurie Greenwood, Greenwoods Bookshoppe; Lynn McKinnon, Classics Bookshop; Andrea Harbour, Common Women's Books. 3-22 Rutherford South.

Comparative Literature

15 November, 3 p.m. Mila Bongco, "Literature of the Philippines." Senate Chamber, Arts Building.
22 November, 3 p.m. James Algeo, "The Literature of Portugal." Senate Chamber, Arts Building.

Moslem Student Association

15 November, 7:30 p.m. Dr. Anwar, "Islamic Movements in the World." 14-14 Tory Building.

Canadian Institute of Ukrainian Studies

15 November, 7:30 p.m. John Lehr, Department of Geography, University of Winnipeg, "The Creation and Evolution of the Ukrainian Landscape in Western Canada." Heritage Lounge, Athabasca Hall.

United Church Chaplaincy

17 November, 7:30 p.m. Richard Price, "Native Self-Determination and Native Rights." Garneau United Church.
24 November, 7:30 p.m. Floyd Steinhauer, "Native Ministry: Between Two Worlds." Garneau United Church.

Plant Science

18 November, 1 p.m. Kris Pruski, "Low-Temperature Preservation of Plant Cells." 1-06 Agriculture-Forestry Centre.
20 November, 1 p.m. Dilip Lakshman, "Detection of Potato Spindle Tuber Viroid by Dot-Spot Nucleic Acid Hybridization Assays." 1-06 Agriculture-Forestry Centre.

Slavic and East European Studies

18 November, 3 p.m. E. Mozejko, "Slavic Literatures as a Distinct Subject of Study: The Case of Romanticism." 776 General Services Building.

Botany

20 November, 4 p.m. John Thompson, Department of Biology, University of Waterloo, "Aging in Plants — The Role Played by Cell Membranes." M-149 Biological Sciences Building.

Agricultural Engineering

20 November, 7:30 p.m. John R. Ogilvie, President, Canadian Society of Agricultural Engineering and Director, School of Engineering, University of Guelph, "Where Are We Going From Here—in Agricultural Engineering, and in the Canadian Society of Agricultural Engineering?" E-343 Chemical-Mineral Engineering Building.

Music

21 November, 9:30 a.m. Philip Brett, "Britten and His Music." 2-34 Fine Arts Building.

Economics and Mathematics

21 November, 3:30 p.m. Robert McKelvey, Montana, "Modelling Groundwater: Irreversible Investment, Common Property Exploitation, and Boom-and-Bust Irrigation Agriculture in the Arid West." 8-22 Tory Building.

History

22 November, 3:05 p.m. J. Retallack, *"I Don't Think We're in Kansas Anymore*: German Junkers React to the Universal Franchise, 1871-1918." 2-58 Tory Building.

Films

Germanic Languages

13 November, 7:30 p.m. "Stationschef Fallermayer." Arts 17.

The Arts

Rutherford House

9 and 10 November, 12:30 to 4:30 p.m. short drama with the Rutherford reacting to the WW I effort. Also, children's art activities, music and crafts. Free admission and refreshments. 11153 Saskatchewan Drive.

Studio Theatre

Until 16 November. "Translations" and "Ashes." 432-2495.

Ring House Gallery

Until 29 November. "Painting the Town"—an exhibition of mural painting in Britain. Galleria, Rutherford Library.
Until 1 December. "Art Nouveau in Fashion." An exhibition of Art Nouveau Clothing from the University's Historic Costume and Textile Study Collection.

Special Collections

Until 13 December, 8:30 a.m. to 4:30 p.m., Monday to Friday. "D.H. Lawrence: A Centenary Celebration." B7 Rutherford South.

SUB Theatre

7, 8 and 9 November, 8 p.m. Andre Gagnon. Shoctor Theatre, Citadel.
9 November, 8 p.m. "A View to a Kill" (1985).
10 November, 8 p.m. The Edmonton CYMK Choir presents the Lastiwka Ukrainian Orthodox Choir of Saskatoon. 466-0810.
13 November, 7 p.m. A CBC Television Taping of Alberta Rock—Rock Alberta, featuring local bands. 469-2321.
15 November, 8 p.m. The Daniel Band. (204) 338-2726.
16 November, 8 p.m. "Compromising Positions" (1985).
17 November, 8 p.m. "Summer Rental" (1985).

Music

All events take place in Convocation Hall.

8 November, 8 p.m. Nicholas Arthur Kilburn Memorial Concert—Elly Ameling, soprano. Tickets must be picked up in advance at the Department of Music.
12 November, 8 p.m. Visiting Artists Series—Purcell String Quartet. Selected works by Haydn, Wallace Berry and Debussy.
17 November, 3 p.m. The University of Alberta Concert Band—Ernest Dalwood, conductor. $4 (adults) and $2 (students/senior citizens).
17 November, 8 p.m. New Music at the University of Alberta featuring works by faculty composers.
19 November, 8 p.m. The University of Alberta Symphonic Wind Ensemble, Fordyce Pier, director; the Edmonton Wind Sinfonia, Dennis Prime, director; and the Cosmopolitan Band, Harry Pinchin, director. $4 (adults) and $2 (students/senior citizens).
22 November, 8 p.m. Academy Strings—Norman Nelson, conductor.

Edmonton Film Society

12 November, 8 p.m. "Breakfast at Tiffany's" (1961).
18 November, 8 p.m. "The Primrose Path" (1940).

Sports

8 November, 2 p.m. Swimming—Bears and Pandas vs. University of Calgary. West Pool.
9 November, 1 p.m. Football—Bears vs. University of British Columbia.
9 November, 4 p.m. Basketball—Pandas vs. Laurentian University.
15 November, 5 p.m. Gymnastics—Green/Gold InterSquad. W.R. Castle Physical Education and Recreation Centre.
15 November, 6:30 p.m. Volleyball—Pandas vs. University of Victoria.
15 November, 7:30 p.m. Wrestling—Bears vs. University of Calgary.
15 November, 7:30 p.m. Hockey—Bears vs. University of Manitoba.
15 November, 8 p.m. Volleyball—Bears vs. University of Victoria.
16 November, 10 a.m. Wrestling—Golden Bears Invitational.
16 November, 6:30 p.m. Volleyball—Pandas vs. University of British Columbia.
16 November, 7:30 p.m. Hockey—Bears vs. University of Manitoba.
16 November, 8 p.m. Volleyball—Bears vs. University of British Columbia.
17 November, 2 p.m. Basketball—Pandas vs. University of Guelph.

Surplus Equipment

The equipment appearing in this column is available only to University departments with University-administered funds. For more information, telephone Jody Brookwell or Roy Bennett, 432-3208.

Wanted: Oscilloscopes, EEG Amplifiers, Electrode Impedance Meter, Sphygmomanometer, Hot Plate, Equipment Racks, Timers, Computer Equipment (Monitors).
Robert Dowman, Neurosurgery, 432-6324.
For Sale: NEC Spinwriter 2050
Barb Powers, Anatomy, 432-3355.

Award Opportunities

Environmental Publication Awards

Donor: The National Wildlife Federation. *Where tenable:* Not applicable. *Level:* Graduate. *Field:* Environmental Sciences. *Value:* Up to $2,500. *Number:* Unspecified. *Duration:* Not applicable. *Conditions:* Must be citizens of the United States, Canada, or Mexico; articles submitted for consideration must be the result of original graduate research and either recently published or accepted for publication in a major refereed journal during the year preceding this annual announcement. *Closing date:* 30 November 1985. *Further information and application forms should be requested from:* Environmental Publication Award, Executive Vice-President, National Wildlife Federation, 1412 Sixteenth Street, N.W., Washington, D.C. 20036-2266 U.S.A.

Commonwealth Scholarships

Donor: AUCC. *Where tenable:* New Zealand. *Level:* Post-graduate. *Field:* Unrestricted. *Value:* Includes travel expenses and is designed to cover the living and study costs of a scholar during tenure of the award. *Number:* Variable. *Duration:* One to three academic years, tenable March 1987. *Conditions:* Available to students who are Canadian citizens to pursue post-graduate study; candidates must have graduated from a recognized university or hold equivalent qualifications; candidates must return to Canada upon completion of the study for which the award was intended; candidates must have a good knowledge of written and spoken English. *Closing date:* 31 December 1985. *Further information and application forms should be requested from:* The Canadian Commonwealth Scholarship and Fellowship Committee, c/o The Association of Universities and Colleges of Canada, 151 Slater Street, Ottawa, Ontario K1P 5N1.

The Terry Fox Humanitarian Award Program

Donor: Government of Canada. *Where tenable:* Canadian universities or colleges. *Level:* Undergraduate. *Field:* Open. *Value:* $3,000 ($2,000 if no tuition fees are applicable). *Number:* Variable. *Duration:* Up to four years or until first degree is obtained. *Conditions:* Based on demonstration of the highest ideals and qualities of citizenship and humanitarian service while in pursuit of excellence in their academic, amateur sport, fitness, health, community service and related endeavors. Candidates must be Canadian citizens or have applied for citizenship at the time of award consideration. *Closing date:* 1 February 1986. *Further information and application forms should be requested from:* Terry Fox Humanitarian Award Program, 711 151 Sparks Street, Ottawa, Ontario K1P 5E3.

Positions

The University of Alberta is committed to the principle of equal opportunity in employment and encourages applications from all qualified people.

In accordance with Canadian Immigration requirements, these advertisements are directed to Canadian citizens and permanent residents.

Academic

Chairman, Department of Industrial and Vocational Education

Applications are invited for the Chairman of the Department of Industrial and Vocational Education. Applications must be received by 1 December 1985. Address enquiries and applications to: Dr. R.S. Patterson, Dean, Faculty of Education, University of Alberta, Edmonton, Alberta T6G 2G5.

Research Associate/Assistant, Muttart Diabetes Research and Training Centre

A Research Associate or Assistant is required by the Muttart Diabetes Research and Training Centre. Applicants with a PhD or MSc are invited to contact Mrs. Shirley Moore, 8-113F Clinical Sciences Building.

Assistant Professor, Department of Anthropology

The Department of Anthropology has an opening for a tenure-track appointment, commencing 1 July 1986, subject to budget approval. Rank is Assistant Professor. 1985 annual salary floor is $30,316. PhD and relevant teaching and research experience are both important. The position is in the area of Anthropology of Religion/Symbolic Anthropology, and preference will be for a candidate with geographic interest in any of: Sub-Saharan Africa, North Asia, South Asia, Northern Canada. However, we are seeking the best candidate and related topics could be considered.

Send applications (including complete curriculum vitae and names of three references) to Dr. Michael I. Asch, Chairman, Department of Anthropology, University of Alberta, Edmonton, Alberta T6G 2H4, by 10 January 1986.

Non-Academic

To obtain further information on the following positions, please contact Personnel Services and Staff Relations, 2-40 Assiniboia Hall, telephone 432-5201. These vacancies cannot be guaranteed beyond 1 November 1985.

Laboratory Assistant II, Provincial Laboratory, ($1,190-$1,478)
Clerk Steno III (Term), Dean of Education, ($1,326-$1,666)
Clerk Steno III, Extension—Special Sessions, ($1,326-$1,666)
Clerk Steno III, Office of the Comptroller, ($1,326-$1,666)
Secretary, Faculty of Extension, ($1,478-$1,888)
Secretary, Educational Research Services, ($1,478-$1,888)
Medical Stenographer (Trust), Medicine, ($1,478-$1,888)
Administrative Clerk, Local Government Studies, ($1,478-$1,888)
Administrative Clerk, Office of Research Services, ($1,478-$1,888)
Food Service Assistant (Part-time), Housing and Food Services, ($444-$548)
Building Services Worker II, Housing and Food Services, ($1,326-$1,666)
Animal Technician I, Biosciences Animal Service, ($1,534-$1,968)
Applications Analyst, Office of the Registrar, ($1,888-$2,437)
Administrative/Personnel Assistant I (Temporary), Personnel Services and Staff Relations, ($1,888-$2,437)
Technologist I (Trust), Medicine—Cardiology, ($1,888-$2,437)
Machinist Technician II, Chemistry, ($1,968-$2,548)
Locksmith, Physical Plant—Maintenance, ($2,053-$2,661)
Technologist IV (Meteorology), Geography, ($2,548-$3,302)
Specialist Technician, Electrical Engineering, ($2,661-$3,475)

For vacant Library positions, please contact the Library Personnel Office, Basement, Cameron Library, 432-3339.

Advertisements

Accommodations available

Rent - Blue Quill. Unfurnished, three-bedroom townhouse. Five appliances, 1 1/2 baths, fireplace, patio, fenced. Available 1 December. 433-9911.
Sale - Pleasantview. Bungalow in convenient crescent location. Reduced to $67,900. Fully developed, excellent garden and garage. Hugh Moncrieff, 436-5250, 452-7740. Spencer's.
Sale - Parkallen. Nice semi-bungalow, reduced to $69,900. Five appliances. Sunny, south yard and deck. Good garage. Home is fully developed. Hugh Moncrieff, 436-5250, 452-7740. Spencer's.
Sale - Seven appliances go with this two-bedroom bungalow. Developed

basement, garage, auto door opener. Ready to move in. Close to University. New everything. Dorothy, 437-7480, res. 434-0332. Royal Lepage.

Sale - Close University. Two-bedroom bungalow. Basement has two bedrooms, kitchen, laundry, recreation room, three-piece bath. Garage. $62,500. Must be sold. Royal LePage. Call Dorothy immediately, 437-7480, res. 434-0332.

Sale - By owner. Clear title. Redesigned, small, semi-bungalow, close to University. Lounge with fireplace, overlooking park-like yard. Available mid-December. Phone 432-4979 or 434-7685 evenings.

Sale - Blue Quill. $98,000. Two-storey, approximately 1,325 sq. ft. plus basement. On huge, pie lot in cul-de-sac. Double, attached garage. Andrea Hammond, 435-5640, Royal LePage, 436-5080.

Sale - University campus three blocks. Three, adjacent bungalows for homes or revenue. Chris Tenove, 433-5664, 436-5250. Spencer's.

Sale - Grandview. Lot 76 feet wide. Half block from ravine. Immaculate, spacious home. Bright and sunny. Large bedrooms. Two fireplaces. For appointment call Chris Tenove, 433-5664, 436-5250. Spencer's.

Sale - Windsor Park. Lot 73'x189'. Quiet location. Immaculate, three-bedroom bungalow. Hardwood floors. Chris Tenove, 433-5664, 436-5250. Spencer's.

Goods for sale

New Royal typewriters $115-$730, some with computer interface and rent-to-own plan. Used electrical typewriters $140. Mark 9, HUB Mall. 432-7936.

Fine, English speakers. Tangent RS6, 3-way system, with stands. $675. 482-1155 evenings.

Five, registered horses. Between one and eight years. One 2 in 1. Arabs, part Arabs and half Trakeher. Riding, show, breeding. Brenda, 487-0099.

Services

Donnic Word Processing. Specializing in theses, manuscripts, etc. 8315A 105 St. 432-1419.

Backaches? Stress tension? Special therapy at Back-Basics (supplementary health care reimburses treatment costs). Maria Krieg is a spine specialist, university-trained in Düsseldorf. 11610 75 Avenue. 436-8059.

Quaker worship, Sundays, 11 a.m. Soroptimist Room, YWCA. 100 Ave. 103 St.

Will do all kinds of renovations, small and large. Phone 434-9709 evenings.

Word processing, photocopying, typing course, theses and résumés. Speed and quality. Mark 9, HUB Mall, 432-7936.

JL Citation Services. Computerized literature searching - all fields. Full searches & automatic updating. Search strategies carefully formulated. Satisfaction guaranteed. 487-8652.

Professional typist - Word processing. Specializing in theses and dissertations. Gwen, 467-9064.

Spectra Office Maneuvers (word processing), 24-hour service. 421-4869.

Thai language classes for beginners. Trained instructor. 486-1126 evenings.

Professional typing. We do "rush stuff". 461-1698.

Drafting, for theses, papers, reports. Reasonable rates, prompt service. Call Linda, 436-5732, days or evenings.

Fellowship for graduate study for females from countries outside Canada whose study will lead to teaching in home country. Contact B. Jonsson, 452-2653. 12902 123A St., Edmonton T5L 0K9.

Cash paid for old, rare, out-of-print and second-hand books in good condition. F. Speur-Books, 10824A 82 (Whyte) Ave. 439-4195.

Lost and found

Lost, bunch, important house keys. University area, 24 October. Please phone 433-1671.